

TA-53 Facility Management

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TA-53 Procedure

Control of Radioactive Materials

53FIR 402-704-01.0

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APPROVALS

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1.0 Introduction

The most common type of radioactive material at TA-53 is produced by interactions of primary particle beams or secondary particles with matter and is usually referred to as “activated” or “volume contaminated” material. (For most purposes at TA-53 the terms are equivalent.) Activated materials may include beam line components, targets, beam stops, shielding, and experimental equipment and samples. Other types of radioactive material may include sources and samples of actinides or other inherently radioactive materials used in experiments.

Radionuclides encountered at TA-53 include activation and spallation products that cover most of the periodic table. The level of activation varies from the lower limits of detection to thousands of rem or rads per hour. Some waste materials, such as used anti-Cs, are byproducts of maintenance work. Individual items may carry a typical radionuclide “signature” depending on parent materials and radiological conditions present in various areas of the accelerator complex.

2.0 Purpose

This procedure establishes facility-specific requirements for the handling and management of radioactive materials at TA-53, and contains requirements for labeling materials so that knowledge of process is maintained.. The objective of this procedure is to ensure that radioactive material movement and storage are accomplished in a manner that protects workers and the public from inadvertent exposures.

3.0 Scope

This procedure applies to the handling, movement, and storage of all radioactive materials within the boundary of TA-53. The control of identifiable removable contamination is not included here but addressed by 10 CFR 835 and applicable Laboratory implementing requirements. This procedure supplements existing requirements such as 10 CFR 835, the LANL Radiation Protection Plan (RPP) standards, and other Laboratory and ESH-1 procedures. DOT transportation requirements are addressed by Laboratory implementation of 49 CFR. Segregation of radioactive waste at TA-53 (the “green is clean” program) is addressed by the current version of 53 FMP 105-01 and LS 105-01. Requirements pertaining to Radiological Control Technicians (RCTs) are addressed by applicable Laboratory and ESH-1 procedures

4.0 Definitions

Activation — The process of inducing radioactivity by irradiation, for example by particle beams.

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Material Owner — The individual having possession or primary custody of a radioactive or potentially radioactive item, or responsibility for its proper control and handling.

Radioactive Material Area (RMA) — For purposes of this procedure, an area not otherwise designated as a Radiological Controlled Area in which radioactive materials are used or stored. At TA-53, an RMA is typically a storage area for radioactive materials. Does not normally apply to installed equipment located within an RCA.

Radiological Controlled Area (RCA) — An area to which access is managed to protect individuals from exposure to radiation or radioactive materials. In an RCA controlled for external radiation, a reasonable potential exists for an individual to receive more than 0.1 rem during a year from external radiation fields. In a RCA controlled for volume contamination (VC-RCA), a reasonable potential exists for the presence of volume contaminated materials that are not individually labeled. At TA-53, RCAs controlled for external radiation only do not contain the potential for volume activation unless there is a very high radiation area within. In an RCA controlled for contamination, a reasonable potential exists for contamination to occur at levels in excess of those specified in DOE 5400.5 Table 1, or a reasonable potential exists for an individual to receive more than 0.1 rem committed effective dose equivalent from intakes.

Volume Contamination — Radioactive contamination dispersed throughout a matrix in excess of the appropriate release criteria. Examples of volume contamination are contaminated liquids and soils, materials activated by irradiation (for example, by particle beams), and smelted metals (where the smelting process incorporates radioactive material into the matrix of the metal). Most volume contamination at TA-53 is created by particle beam irradiation.

5.0 Responsibilities

If you are a	Then you must
Material owner	<ul style="list-style-type: none"> • follow the requirements stated in this procedure
Supervisor or line manager	<ul style="list-style-type: none"> • ensure that personnel under your supervision comply with requirements of this procedure and have been trained on its requirements • develop group- or area-specific procedures for radioactive material control where necessary to implement this procedure
ESH-1	<ul style="list-style-type: none"> • perform surveys in accordance with the appropriate ESH-1 procedures and tag/label items accordingly • establish appropriate release criteria and determine when items are acceptable for release • provide supplies of Radioactive Material labels in appropriate areas

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6.0 Precautions and Limitations

- 6.1 Failure to follow the requirements of this procedure could result in loss of control of radioactive material causing unplanned exposure to workers or members of the public, or contamination of the environment.
- 6.2 All radiological surveys of record and sample analyses shall be performed in accordance with the appropriate established Laboratory and ESH procedures, and can be performed only by personnel trained in the appropriate survey and analytical methods. RCTs perform surveys, and personnel authorized by to operate HPAL or TA-53 count lab instruments carry out analytical work.
- 6.3 Laboratory policy requires that no item may be released to the public unless it meets criteria for “no detectable activity” (NDA).
- 6.4 Federal regulations Department of Energy directives, and Laboratory standards include requirements for radioactive material labeling and control. Certain low levels of radioactivity have been established (e.g., Table 2-2 of the DOE Radiological Control Manual) below which materials within radiologically controlled area (RCA) boundaries do not have to be labeled. However, since most RCAs at TA-53 are established for the external radiation hazard only, this procedure includes additional requirements for labeling materials so that knowledge of process is maintained.

7.0 Procedure

- 7.1 Labeling
 - 7.1.1 Materials that are determined by RCT survey to be radioactive (greater than NDA criteria) shall be tagged by the RCT with the Health Physics Radioactive Material Survey Tag according to Laboratory and ESH-1 requirements.
 - 7.1.2 Materials that are determined by RCT survey to be non-radioactive (no detectable activity) shall be tagged by the RCT with the Health Physics Release Tag according to Laboratory and ESH-1 requirements.
 - 7.1.3 Materials that are potentially radioactive or are awaiting survey results shall be either:
 - marked with the Radioactive Material label shown in Figure 1;
 - placed in a container bearing the Radioactive Material label shown in Figure 1; or

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- stored in a posted Radioactive Material Area. If stored in an RMA and not individually labeled, items should be logged in and out of the RMA to maintain knowledge of process.

The Radioactive Material label may be applied by any trained worker. It may be removed from an item or container only by an RCT after completion of an appropriate survey or receipt of survey results. The label shall be replaced only by a Health Physics Radioactive Materials Survey Tag or a Health Physics Release Tag.

7.2 Storage

- 7.2.1 Radioactive or potentially radioactive materials must be stored in accordance with Laboratory and ESH-1 requirements. Radioactive Material Areas (RMAs) must be posted as such and may be located in controlled or uncontrolled areas. Cabinets, transportainers, fenced areas, rooms, roped-off areas and similar clearly bounded areas may be used for RMAs.

Note: Storage practices must take into account proper radiological posting. For example, storage in a Radioactive Material Area outside of a Radiation Area must meet the criterion of <5 mR/hr at 30 cm.

- 7.2.2 The distinction between radioactive and non-radioactive material storage shall be made evident by posting or labeling. Radioactive and non-radioactive stored in secondary beam areas (e.g., ER-1/2, MPF-29) shall be segregated. Segregation is not required for primary beam areas (e.g., Blue Room, switchyard, PSR).

7.3 Removal of materials from RCAs

- 7.3.1 Primary beam areas and neutron flight paths where the potential for material activation exists are posted as volume contamination RCAs. Exit postings at the boundaries of VC-RCAs and some RCAs require RCT survey of materials before removing the materials from the RCA. Individual postings address specifics, but survey is typically required for materials that have been in a primary beam area/VC-RCA during beam delivery. Workers must read and follow all exit postings.
- 7.3.2 Beam line components, experiment samples, facility equipment, and other types of materials often are removed from the immediate area of potential activation (e.g., flight paths, beam lines, primary beam areas) without being removed from the surrounding RCA. In doing so, knowledge of process for potentially radioactive items can be lost. To prevent loss of knowledge of process, one of the following two options shall be used:

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- 7.3.2.1 Immediate RCT survey and tagging with a Health Physics Radioactive Materials Survey Tag or a Health Physics Release Tag, as appropriate.
- 7.3.2.2 Labeling of the item with the Radioactive Materials label shown in Figure 1. Any trained worker (see 7.5) may apply this label. A supply of these labels will be made available by ESH-1 for use by material owners in ER-1/2, PSR, Blue Room, Area A/B/C, switchyard, beam tunnels, and other areas as needed. When applying the label, either the "pending RCT survey" or "awaiting survey results" box must be checked. The latter box should be checked only by an RCT after a survey and includes spaces for RCT initials and date, indicating when a sample was taken.

Exceptions to 7.3.2 will be made when unacceptable personnel exposures (violation of standard ALARA practices or approved ALARA planning, gross exceedances of dose budgets, etc.) would result from the labeling activity. When such an exception occurs, identification of the material will be accomplished by other means such as marking of a storage cask, storage in an existing high radiation area, RWP documentation, and so forth.

7.4 Transport and handling

- 7.4.1 The TA-53 entrance gate is the boundary between public and non-public roads. Transport of radioactive materials beyond the TA-53 entrance gate must be in accordance with DOT requirements.
- 7.4.2 The Radioactive Material label or the Health Physics Radioactive Material Survey Tag shall be applied to radioactive materials when they are transferred from one RCA to another (or to a posted Radioactive Material Area) through uncontrolled space. This may include transfer to a low background area for RCT survey.
- 7.4.3 When an item labeled with a Radioactive Material label or a Health Physics Radioactive Material Survey Tag is disassembled, the component parts shall be either labeled with a Radioactive Material label or surveyed by an RCT and tagged appropriately.

- 7.5 Training. Line management shall ensure that personnel who work in areas where radioactive materials are used/stored or where materials can become activated receive training in the requirements of this procedure. The LANSCE training office shall provide appropriate training and record the completion of training.

8.0 Required Records


ESH-1 survey records

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9.0 References

- LPR 402-717.0, *Storage and Labeling*
- LP 107-04.1, *Releasing Materials and Equipment*
- LIR 402-712-01, *Radiological Posting*
- ESH-1-14-01, *Packaging, Transporting, Storing, Controlling, and Handling of Radioactive Material and Radioactive Waste*
- ESH-1/TA-53-DP-812, *Procedure for Processing Potential Volume/Bulk Contamination at TA-53*
- 53FMP 105-01, *Control of Radioactive Waste*

Figure 1. Radioactive Materials label

<div><div>CAUTION</div><div></div><div>RADIOACTIVE MATERIAL</div><div><hr/></div><div><input type="checkbox"/> PENDING RCT SURVEY</div><div><input type="checkbox"/> AWAITING SURVEY RESULTS</div><div>RCT _____ Date _____</div><div>XXRP3A00</div></div>
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